2. PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

DOE proposes to disposition site wastes as needed. For the purpose of this EA, disposition activities are defined as any actions taken to maintain and/or manage Paducah Site wastes. Disposition activities may include characterization, storage, packaging, treatment, loading, and shipping existing and forecasted Paducah Site wastes to treatment/disposal locations. For analysis purposes, Table 1.1 presents typical Paducah Site wastes and approximate volumes. Mitigations and best management practices may be applied for each disposition activity. Mitigations are identified in Chap. 4. Approximated waste volumes for each of the following activities include anticipated quantities of postcharacterized DMSA wastes.

2.1.1 Storage

Under the proposed action, all waste would be stored at the Paducah Site until it is scheduled for treatment, disposal, or transport from the Paducah Site. Existing facilities would be used for waste storage. At this time, it is not anticipated that any new waste storage facilities would be constructed. DMSA wastes that are not characterized as RCRA/TSCA waste would remain in storage until analyzed during D&D CERCLA actions.

2.1.2 On-Site Treatment

On-site treatment applies to approximately 200 m^3 (7060 ft^3) of the approximate 11,000 m^3 (390,000 ft^3) non-PCB waste volume covered in this EA, which includes up to 120 m^3 (4238 ft^3) of MLLW solids, 12 m^3 (424 ft^2) of ^{99}Tc-contaminated MLLW, and 6 m^3 (211 ft^3) of TRU waste. On-site treatment technologies are limited by the Paducah Site RCRA Part B permit. RCRA-permitted on-site treatment technologies include sedimentation, precipitation, oxidation, reduction, neutralization, and cementation/solidification. Currently, only neutralization, stabilization, carbon adsorption, and photocatalytic conversion are proposed on-site. These are the only technologies discussed in subsequent sections because they are the ones applicable to waste types presented. Building C-752-A has been proposed as the site for processing any on-site waste that needs to be treated.

Another 52 m^3 (1836 ft^3)/year of wastewater would also be treated on-site. Volumes listed are approximate. Wastewater would be treated on-site by carbon adsorption, photocatalyic conversion, and/or lime precipitation. These treatment activities would be compliant with the applicable Kentucky Pollutant Discharge Elimination System (KPDES) permit(s). Short descriptions of the proposed treatment technologies are presented in the following sections.

2.1.2.1 Neutralization

Neutralization reduces the acidity or alkalinity of hazardous wastes in a waste stream to a more neutral condition. The process consists of blending acids and bases in order to adjust the pH (a measure of acidity or alkalinity) to yield a neutral solution of salt and water. Alkaline wastes often are mixed with acid wastes, thereby neutralizing two waste streams at the same time. Neutralized waste is safer to store, transport, and dispose than acidic or alkaline waste.

2.1.2.2 Cementation/solidification

In a cementation/solidification process, some fixation renders the waste less hazardous by reducing the ability of the waste constituents to migrate. Solidification and encapsulation bind wastes into a solid

mass that would not readily break down. Chemical fixation treatment methods often are employed to tie up hazardous components. These methods reduce leachability, even though the hazardous waste constituents may not be altered. Inorganic materials in aqueous solutions and suspension of metals or inorganic salts are most amenable to this technique. This process reduces mobility of the hazardous constituent or waste and makes the waste easier to handle. The most common stabilization agents added to the waste streams are Portland cement, lime, fly ash, and cement kiln dust.

A portion of the MLLW streams would be treated by on-site or off-site stabilization (Table 1.1). Approximately 10 m^3 (353 ft^3) of TRU liquids and solids would be treated on-site by solidification.

2.1.2.3 Carbon adsorption

Carbon adsorption is a process that uses activated carbon to adsorb hazardous waste constituents. Upon contact with waste containing soluble organic materials, granular activated carbon selectively removes these materials by adsorption. Adsorption is the phenomenon whereby molecules adhere to a surface with which they come into contact, due to forces of attraction at the surface.

Only the wastewater stream, consisting of approximately 52 m^3 (1836 ft^3) of waste, may be potentially treated on-site annually by this method. The wastewater, which has some organic contamination, would be treated until KPDES limits are met; this waste would then be discharged at a permitted site outfall.

2.1.2.4 Photocatalytic conversion.

Photocatalytic conversion is a system that uses ultraviolet radiation in the presence of a catalyst to treat waste by breaking down the contaminants. Only the wastewater stream may be treated by this method. The wastewater would be tested after treatment and would then be discharged through an existing permitted outfall.

2.1.3 Off-site Treatment

DOE's proposed action for off-site treatment varies by waste type. The characteristics of the waste govern where and how each waste type may be treated. The proposed treatment scenario for each type of currently known waste is listed below.

2.1.3.1 PCB waste

Fifty metric tons of capacitors containing PCBs are proposed for shipment to Deer Park, Texas, for treatment and disposal. The capacitors would be shipped in 23 7A, Type A containers. Thirteen empty transformers weighing 78 metric tons would be shipped for off-site treatment and disposal at Deer Park, Texas, as well. These transformers contain some residual PCB contamination.

2.1.3.2 Mixed low-level waste

The approximate 5700 m^3 (201,294 ft^3) of MLLW addressed in this proposed action represents a very heterogeneous grouping of wastes; most of this waste would be treated and disposed at various off-site, permitted facilities. A small portion contains PCBs, metals, and organics, and it is proposed that they be treated at the DOE TSCA Incinerator in Oak Ridge, Tennessee.

2.1.4 Waste Transport

Waste would generally be transported by truck but may also be transported by rail or intermodal carrier when advantageous. Figures 3.2 through 3.13 in Chap. 3 of this document depict the most direct

representative truck and rail routes. Intermodal options are too numerous to present but could be used to comply with state requirements and stakeholder requests. Characterized DMSA wastes would be transported with similar wastes described herein.

2.1.5 Waste Disposal

All wastes are proposed to be disposed offsite. DOE's proposed action for waste disposal varies by waste type. The characteristics of the waste govern where and how each waste type may be disposed. The volume of wastes to be transported from the Paducah Site to each proposed receiving facility represents only a small portion of the total waste each facility receives annually. The proposed action for each waste type is listed below.

2.1.5.1 PCB wastes

Fifty metric tons of capacitors containing PCBs are proposed for shipment to Deer Park, Texas, for treatment and disposal. The capacitors would be shipped in 23 7A, Type A containers. Thirteen empty transformers weighing 78 metric tons would be shipped for off-site treatment and disposal at Deer Park, Texas, as well. These transformers contain some residual PCB contamination.

2.1.5.2 Low-level wastes

Approximately 4600 m^3 (162,447ft^3) of LLW would be disposed, primarily at the Nevada Test Site. In addition to these wastes, there are 22 T-Hoppers (5-ton containers) of UF_4 stored at the site. If it is determined that this material is a waste, it would likely be shipped as an LLW to the Nevada Test Site.

2.1.5.3 Mixed low-level wastes

Some MLLW would be shipped to Envirocare for treatment and disposal. The majority of this waste would be shipped to one or more of the Broad Spectrum Contractors (Waste Control Specialists LLC, Andrews, Texas; Allied Technology Group, Richland, Washington; Materials & Energy/Waste Control Specialists, Oak Ridge, Tennessee) for treatment and/or disposal.

2.1.5.4 TRU wastes

Approximately 6 m^3 of TRU liquids and solids are proposed for treatment on-site by cementation/ solidification and shipment to the TRU Waste Program at Oak Ridge National Laboratory (ORNL) for ultimate disposition. The state department of environment and conservation contends that off-site TRU waste whipments to Tennessee shall be for undelayed treatment, packaging, and shipment to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. Impacts associated with further processing and shipment to the WIPP are addressed in the Final Environmental Impact Statement for Treating TRU and Alpha LLW (DOE 2000a).

2.1.6 Waste Disposition Supporting Activities

The proposed action for supporting waste disposition activities is to perform these activities in accordance with DOE orders, federal and state regulations, and approved Bechtel Jacobs Company, LLC (BJC) or BJC subcontractor procedures. These activities are performed mainly during waste management and maintenance at the Paducah Site. Applicable procedures are implemented to ensure that activities are performed in a safe and accountable manner. Examples of supporting activities include, but are not limited to, the following:

- waste staging,
- on-site waste movement,

- packaging/repackaging,
- sorting,
- volume reduction,
- physical,
- waste container decontamination,
- inspection,
- marking/labeling,
- characterization, and
- facility modifications or upgrades.

2.1.7 DMSA Characterization

Quantities of DMSA solid and liquid waste are stored on-site at approximately 160 locations at the Paducah Site. The DMSA waste volumes include approximately 20,000 m^3 (705,000 ft^3) of solid and liquid waste of which potentially 2.5% or approximately 500 m^3 (17,625 ft^3) could be RCRA/TSCA waste. Due to the undetermined nature of a majority of the DMSA wastes, Nuclear Criticality Safety (NCS) characterization must be performed. DOE's proposed action includes this type of characterization in addition to standard waste management operations. NCS characterization provides the information necessary to move or manage materials safely without the threat of uncontrolled nuclear criticality. NCS characterization includes the DMSA inspector's determination of the proper NCS status for items that would be based upon a review of documentation, process knowledge, and/or visual inspection. Based upon the completion of the NCS characterization, standard waste management operations would commence, including waste sampling, characterization, sorting, and movement.

2.2 NO ACTION ALTERNATIVE

In the No Action alternative (i.e., long-term storage), DOE would not perform disposition activities except for those needed for waste management and maintenance. No disposal of the existing and projected quantities of various wastes outlined in Table 1.1 and discussed under the proposed action would occur. It should be noted that the No Action alternative would not be compliant with regulatory agreements or the statutory and regulatory provisions described in Sect. 1.1. Ongoing non-CERCLA waste management operations would continue.

2.2.1 Storage

The majority of wastes discussed would remain in on-site storage and would require regular maintenance and surveillance by the Paducah Site staff. Also included under the No Action alternative would be facility upgrades and repackaging as needed. The WM-PEIS (DOE 1997) assessed long-term storage as its No Action alternative.

Because existing storage space would be rapidly exhausted, new facilities would have to be constructed on-site to store newly generated wastes and some legacy wastes that cannot remain in outside storage. The siting of a new waste storage facility has not been determined. Construction and operation of a potential new storage facility at a location in the northwest portion of the Paducah Site was analyzed in an environmental assessment and found to have no significant impact (DOE 1994).

2.2.2 On-Site treatment

On-site treatment would be performed on wastes that require some type of stabilization prior to storage. Any on-site waste treatment requiring indoor processing would occur in Bldg. C-752-A or

another suitable location. The on-site treatment technologies are limited by the RCRA Part B permit. Only a subset of permitted technologies are anticipate to be implemented and are discussed in detail in Sect. 2.1.

2.2.3 Off-site treatment

Under the No Action alternative, no waste would be shipped off-site for treatment.

2.2.4 Waste Transport

Relatively small volumes of waste would continue to be shipped to DOE or commercial disposal facilities under existing and previously approved categorical exclusions (CXs). As these CXs expire, no new ones would be placed, and the waste would then be stored on-site.

2.2.5 Waste Disposal

No waste disposal would occur under the No Action alternative.

2.2.6 Waste Disposition Supporting Activities

Supporting activities for waste under the No Action alternative are the same as for the proposed action, as discussed in Sect. 2.1.6.

2.2.7 DMSA Characterization

No DMSA characterization would occur under the No Action alternative. The DMSA materials would remain stored as they are currently.

2.3 ENHANCED STORAGE ALTERNATIVE

In the Enhanced Storage Alternative (i.e., fortified, long-term storage), DOE would not perform disposition activities except for those needed for waste management and maintenance. This alternative is identical to the No Action alternative except the storage facilities would be constructed for resistance to disasters (such as earthquakes, fires and breech accidents). No disposal of the existing and projected quantities of various wastes outlined in Table 1.1, and discussed under the proposed action, would occur. It should be noted that the enhanced storage alternative would not be compliant with regulatory agreements or the statutory and regulatory provisions described in Sect. 1.1. Ongoing non-CERCLA waste management operations would continue.

2.3.1 Storage

The wastes discussed would be placed in an enhanced on-site storage facility and would require regular maintenance and surveillance by the Paducah Site staff. Also included under this alternative are facility upgrades and waste repackaging as needed.

Because existing storage space does not meet enhanced storage definitions, new facilities would have to be constructed on-site to store wastes. The location of a new enhanced storage facility has not been determined. Construction and operation of a potential new storage facility at a location in the northwest portion of the Paducah Site was analyzed in an environmental assessment and found to have no significant impact (DOE 1994).

2.3.2 On-Site treatment

On-site treatment would be performed on wastes that require stabilization prior to storage. Any on-site waste treatment requiring indoor processing would occur in Bldg. C-752-A or another suitable location. The on-site treatment technologies are limited by the RCRA Part B permit. Only a subset of permitted technologies is anticipated to be implemented and is discussed in detail in Sect. 2.1.

2.3.3 Off-site treatment

Under the Enhanced Storage alternative, no waste would be shipped off-site for treatment.

2.3.4 Waste Transport

Relatively small volumes of waste would continue to be shipped to DOE or commercial disposal facilities under existing and previously approved CXs. As these CXs expire, no new ones would be placed, and the waste would then be stored on-site.

2.3.5 Waste Disposal

No waste disposal would occur under the Enhanced Storage alternative.

2.3.6 Waste Disposition Supporting Activities

Supporting activities for waste under the Enhanced Storage alternative are the same as for the proposed action, as discussed in Sect. 2.1.6.

2.3.7 DMSA Characterization

DMSA characterization would occur as planned for the proposed alternative under the Enhanced Storage alternative.

2.4 ALTERNATIVES CONSIDERED BUT DISMISSED

2.4.1 On-Site Treatment of All Wastes

On-site treatment of all wastes has been dismissed because some technologies needed for waste treatment do not currently exist at the site. Building new facilities to treat all waste types would not be cost effective, would be contrary to decision documents already placed by DOE (see Tables 1.2 and 1.3), and, finally, would not be compliant with the regulatory agreements discussed in Sect. 1.1. On-site treatment of a small amount of waste is proposed under the proposed action and would be accomplished in accordance with the site's RCRA permit and regulatory agreements.

2.4.2 Off-Site Treatment of All Wastes

Off-site treatment of all wastes has been dismissed because some treatment activities are necessary to meet U.S. Department of Transportation (DOT) transportation requirements. Shipping certain waste without treatment would result in violation of DOT regulations. This alternative would also be contradictory to decision documents already placed by DOE (Table 1.2).

2.4.3 On-Site Disposal of All Wastes

DOE considered the option to dispose all wastes on-site. This action would result in the need for new landfill cells built for this purpose. This alternative was not considered reasonable. DOE has already analyzed waste from across the DOE complex and has decided where various waste types should be disposed (see Tables 1.2 and 1.3). In addition, some wastes would have to be shipped offsite for treatement then back to the Paducah site for disposal. Risks associated with shipment of wastes offsite for treatment back to the site for disposal, combined with the impacts from constructing new landfill cells, argue against such an alternative. Finally, this alternative is opposed by local residents; therefore, it was not evaluated further.